Equatorial Comparisons of Jupiter, Uranus and Neptune with certain Stars in Newcomb's Standard Catalogue. By John Tebbutt.

The accompanying observations have been made with the 8-inch equatorial refractor and filar-micrometer, and under favourable conditions. In the comparisons of *Jupiter* the first and second limbs were both observed at each transit, and the north and south limbs alternately; in those of *Uranus* the planet's centre was observed on April 18 and May 16, and on each intermediate date the first and north and the second and south limbs alternately; the centre of *Neptune* was observed throughout. In the reduction to the centres the data of the *Nautical Almanac* were employed. The differential co-ordinates have been corrected for refraction and a small error in the perpendicularity of the micrometer threads. The adopted mean places of the comparison stars are the results of an elaborate investigation by Mr. C. J. Merfield, F.R.A.S., from all available catalogues, and are as follows :—

Star.	Epoch.	Mean R.A.	No. of Catalogue.	No. of Obs.	Mean N.P.D.	No. of Catalogue.	No. of Obs.
		h m s			° ′ ″		
η Virginis	1898·0	12 14 41·20	44	1161	90 6 0·0	41	731
ω^1 Scorpii	1898 0	16 0 50·39	18	80	110 23 35·5	18	76
ω^2 Scorpii	1898·0	16 1 25·35	22	118	110 35 36·1	21	108
114 (o) Tauri	1899·0	5 21 34·10	25	99	68 8 58·2	23	1

The planet observations are compared respectively with the mean noon ephemeris of *Jupiter* and with the transit ephemerides of *Uranus* and *Neptune* of the *Nautical Almanac*. Weighting the results according to the number of comparisons in each we have the following for the mean corrections to the *Nautical Almanac* :—

From Jupiter and η Virginis	ΔR.A. =	$+0^s\cdot09$	ΔN.P.D. = $-0''\cdot5$
„ Uranus and ω^1 Scorpii	„	$-0^s\cdot20$	„ $+0''\cdot8$
„ Uranus and ω^2 Scorpii	„	$-0^s\cdot20$	„ $+0''\cdot3$
„ Neptune and 114 (o) Tauri	„	$-0^s\cdot32$	„ $+2''\cdot6$

Date.	Windsor Mean Time.	Comps.	Planet's Centre —Star. R.A.	N.P.D.	Star Reductions. R.A.	N.P.D.	Parallax Corrections. R.A.	N.P.D.	Geocentric Apparent Place of Planet's Centre. R.A.	N.P.D.	Corrections to *Nautical Almanac*. R.A.	N.P.D.
					Jupiter and η Virginis.							
1898.	h m s		m s	′ ″	s	″	s	″	h m s	° ′ ″	s	″
April 2	9 58 27	10	+4 3·42	+11 20·8	+2·94	+19·4	−0·05	+1·1	12 18 47·51	90 17 41·3	+0·02	+0·4
,, 3	10 21 42	10	+3 35·13	+ 8 19·4	+2·94	+19·4	−0·03	+1·1	12 18 19·24	90 14 39·9	+0·08	+0·1
,, 4	8 53 53	14	+3 9·06	+ 5 33·2	+2·95	+19·4	−0·07	+1·1	12 17 53·14	90 11 53·7	+0·02	−0·1
,, 6	9 37 40	20	+2 13·37	− 0 21·6	+2·95	+19·4	−0·05	+1·1	12 16 57·47	90 5 58·9	+0·08	−0·6
,, 7	9 13 8	20	+1 46·77	− 3 10·5	+2·95	+19·4	−0·06	+1·1	12 16 30·86	90 3 10·0	+0·14	−0·6
,, 8	8 44 32	8	+1 20·39	− 5 57·7	+2·95	+19·4	−0·07	+1·1	12 16 4·47	90 0 22 8	+0·13	−1·2
,, 9	8 11 40	9	+0 54·33	− 8 42·4	+2·96	+19·4	−0·08	+1·1	12 15 38·41	89 57 38·1	+0·14	−1·5
					Uranus and ω¹ Scorpii.							
1898.	h m s		m s	′ ″	s	″	s	″	h m s	° ′ ″	s	
April 18	11 31 20	15	+2 26·60	...	+3·21	...	−0·02	...	16 3 20·18	...	−0·21	...
,, 19	11 13 43	14	+2 18·63	...	+3·23	...	−0·02	...	16 3 12·23	...	−0·22	...
,, 21	11 27 12	10	+2 2·10	...	+3·28	...	−0·02	...	16 2 55·75	...	−0·16	...
,, 27	11 27 10	12	+1 9·55	...	+3·40	...	−0·02	...	16 2 3·32	...	−0·19	...
,, 28	10 15 10	14	+1 0·82	...	+3·42	...	−0·02	...	16 1 54·61	...	−0·23	...
,, 29	10 45 2	14	+0 51·49	...	+3·44	...	−0·02	...	16 1 45·30	...	−0·12	...
May 7	9 36 16	9	−0 25·30	+ 2 33·7	+3·58	+13·2	−0·02	+0·2	16 0 28·65	110 26 22·6	−0·23	+1·1
,, 8	9 42 37	20	−0 35·35	+ 2 5·4	+3·60	+13·3	−0·02	+0·2	16 0 18·62	110 25 54·4	−0·25	+1·0
,, 13	10 1 44	14	−1 26·13	− 0 17·4	+3·67	+13·3	−0·02	+0·1	15 59 27·91	110 23 31·5	−0·16	+0·8
,, 16	10 4 54	10	−1 57·15	− 1 45·4	+3·72	+13·4	−0·02	+0·1	15 58 56·94	110 22 3·6	−0·20	+0·2

Date.	Windsor Mean Time.	Comps.	Planet's Centre −Star. R.A.	Planet's Centre −Star. N.P.D.	Star Reductions. R.A.	Star Reductions. N.P.D.	Parallax Corrections. R.A.	Parallax Corrections. N.P.D.	Geocentric Apparent Place of Planet's Centre. R.A.	Geocentric Apparent Place of Planet's Centre. N.P.D.	Corrections to *Nautical Almanac.* R.A.	Corrections to *Nautical Almanac.* N.P.D.
					Uranus and ω^2 *Scorpii.*							
1898.	h m s		m s	′ ″	s	″	s	″	h m s	° ′ ″	s	″
April 18	11 31 20	15	+1 51·69	− 1 31·4	+3·22	+12·6	−0·02	+0·1	16 3 20·24	110 34 17·4	−0·15	+0·2
„ 19	11 13 43	14	+1 43·71	− 1 53·4	+3·24	+12·6	−0·02	+0·2	16 3 12·28	110 33 55·5	−0·17	+0·1
„ 21	11 27 12	10	+1 27·19	− 2 38·4	+3·28	+12·7	−0·02	+0·1	16 2 55·80	110 33 10·5	−0·11	+0·6
„ 27	11 27 10	12	+0 34·51	− 5 3·9	+3·40	+12·9	−0·02	+0·1	16 2 3·24	110 30 45·2	−0·27	+0·1
„ 28	10 15 10	14	+0 25·87	− 5 28·1	+3·43	+12·9	−0·02	+0·2	16 1 54·63	110 30 21·1	−0·21	+0 1
„ 29	10 45 2	14	+0 16·43	− 5 53·7	+3·44	+13·0	−0·02	+0·1	16 1 45·20	110 29 55·5	−0·22	+0·6
May 7	9 36 16	9	−1 0·23	...	+3·59	...	−0·02	...	16 0 28·69	...	−0·19	...
„ 8	9 42 37	20	−1 10·30	...	+3·60	...	−0·02	...	16 0 18·63	...	−0·24	...
„ 13	10 1 44	14	−2 1·20	...	+3·68	...	−0·02	...	15 59 27·81	...	−0·26	...
„ 16	10 4 54	10	−2 32·07	...	+3·73	...	−0·02	...	15 58 56·99	...	−0·15	...
					Neptune and 114 (*o*) *Tauri.*							
1899	h m s		m s	′ ″	s	″	s	″	h m s	° ′ ″	s	″
Feb. 22	9 53 9	10	+3 52·90	− 2 53·8	+2·26	− 3·0	+0·01	+0·2	5 25 29·27	68 6 1·6	−0 34	+3·1
„ 23	8 50 0	10	+3 51·68	− 2 55·5	+2·24	− 3·0	+0·01	+0·2	5 25 28·03	68 5 59·9	−0·41	+3·4
„ 24	8 31 55	16	+3 50·69	− 2 58·9	+2·23	− 3·0	+0·01	+0·2	5 25 27·03	68 5 56·5	−0·35	+2·2
„ 25	8 29 43	15	+3 49·85	− 3 0·9	+2·21	− 3·0	+0·01	+0·2	5 25 26·17	68 5 54·5	−0·28	+2·5
„ 27	8 39 52	15	+3 48·39	− 3 6·2	+2·18	− 2 9	+0·01	+0 2	5 25 24 68	68 5 49·3	−0·32	+2·3
„ 28	8 23 50	14	+3 47·97	− 3 8·5	+2·16	− 2·9	+0 01	+0·2	5 25 24·24	68 5 47·0	−0·27	+2·7

Peninsula Observatory, Windsor, N.S. Wales:
1899 *May* 1.

Ephemeris for Physical Observations of the Moon for the Second Half of 1899. By A. C. D. Crommelin.

Greenwich Midnight.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration Sel. Long. of the Earth.	Geocentric Libration Lat. of the Earth.	Combined Amount.	Direction.
1899.	°	°	°	°	°	°
July 1	195·76	−0·30	+6·74	−5·71	8·83	229·7
2	208·00	0·33	+6·59	−4·72	8·11	234·4
3	220·24	0·35	+6·15	−3·52	7·07	240·2
4	232·49	0·37	+5·47	−2·17	5·91	248·4
5	244·73	0·40	+4·58	−0·75	4·63	260·7
6	256 98	0·42	+3·52	+0·70	3·59	281·2
7	269·24	−0·44	+2·33	+2·09	3·12	311·9
8	281·49	0·47	+1·05	+3·38	3·55	342·7
9	293·74	0·49	−0·28	+4·52	4·54	3·5
10	305·98	0·51	−1·63	+5·46	5·68	16·6
11	318·22	0·53	−2·95	+6·16	6·84	25·6
12	330·47	0·56	−4·19	+6·61	7·80	32·4
13	342·70	−0·58	−5·31	+6·77	8·60	38·1
14	354·93	0·61	−6·24	+6·63	9·08	43·3
15	7·16	0·63	−6·93	+6·17	9·29	48·3
16	19·38	0·66	−7·30	+5·41	9·05	53·5
17	31·59	0·68	−7·31	+4·33	8·48	59·4
18	43·79	0·71	−6·90	+2·99	7·52	66·6
19	55·99	−0·74	−6·06	+1·42	6·24	76·8
20	68·19	0·76	−4·79	−0·28	4·80	93·3
21	80·37	0·79	−3·15	−2·00	3·72	122·4
22	92·56	0·82	−1·25	−3·61	3·82	160·9
23	104·74	0·85	+0·79	−4·98	5·03	189·0
24	116·93	0·87	+2·78	−5·98	6·58	204·9
25	129·12	−0·89	+4·57	−6·57	8·01	214·8
26	141·32	0·92	+6·03	−6·71	8·99	221·9
27	153·53	0·94	+7·05	−6·44	9·52	227·6
28	165·74	0·96	+7·62	−5·80	9·60	232·7
29	177·96	0·98	+7·74	−4·86	9·13	237·9
30	190·18	0·99	+7·46	−3·69	8·36	243·7
31	202·41	−1·01	+6·84	−2·38	7·25	250·8
Aug. 1	214·65	1·03	+5·94	−0·98	6·00	260·6
2	226·89	−1·04	+4·85	+0·43	4·87	275·1